Presque Isle

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region III - 6th & Walnut Sts.
Philadelphia, Pa. 19106

SUBJECT: PRESQUE ISLE SITE **DATE:** 11 July 1984

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TO: ED SHOENER

In preparing this report I have reviewed data in the RAMP of November 1983 and D'Appolonia's Interim Report for Hammermill Paper Co. of March 1983.

This report will consider the toxicology of pollutants in contaminated brine seepage around the abandoned gas well on Presque Isle and residual low level H_2S air pollution at the site.

Priority pollutants in contaminated brine

Four measurements have been made in test wells near the abandoned gas well (which has now been sealed), one in the Hammermill report and three in the RAMP. Maximal values for metals at the site are (ppb): lead (1,190), chromium (110), cadmium (180), selenium (1000) and arsenic (500). In all reported values except for selenium the RAMP values exceed those of the Hammermill report. If these concentrations were found in surface or groundwater, they would be in violation of drinking water standards for all metals. Most problematic would be arsenic, which is present in RAMP test well 2 at 500 ppb, which is 2.5×10^5-fold in excess of the Ambient Water Quality. The meaning of this number is that one-fourth of the persons drinking this water could be expected over a lifetime to develop cancer (primarily

skin cancer) from this source.

Although arsenic was not tested for in shallow wells along the Lake Erie shore, it is significant that it was not detected in Renkis Well samples (which serve as a control) and yet was present in one domestic well sample at 27 ppb. This value is 13,500 times the Ambient Water Quality Criterion guideline. It would be useful to know if this arsenic contamination of one domestic well emanates from the heavily contaminated Presque Isle site.

Organic pollutants were found at the site in trace amounts, considered both qualitatively and quantitatively to carry little if any potential health risk through possible contamination of groundwater or surface water supplies.

Although nickel was not tested for in the RAMP analyses, it was reported at the site in seepage at 3,800 ppb by D'Appolonia. This is 284 times the recommended Ambient Water Quality Criterion, and, if heavily contaminating drinking water supplies, represents a potential carcinogenic threat to consumers. Furthermore, as an allergen, nickel represents an additional threat to any of the island's 3.4 million tourists who might contact sand at the site (number of annual visitors to Presque Isle).

Summary - Of the potential threats to surface and groundwater supplies from seepage around the abandoned gas well (#7), arsenic is the worst potential hazard followed by nickel. It is suggested that these two metals be tested in shallow wells along Lake Erie (apparently they were not) before making any further conclusion. There is some suggestion of well water contamination by arsenic from the site.

Hydrogen sulfide (H_2S)

Sulfides are contaminating the Presque Isle site sufficiently to under acidic conditions in this sandy soil to evolve considerable H_2S. Sulfide concentrations in some samples measure as high as 125 ppm and H_2S has been found as high as 10 ppm. It is likely, even with capping of the site, that H_2S will continue to evolve at the site.

Occupationally, the TLV for H_2S is 10 ppm. If we apply the "420 rule," this in the ambient environment would be adjusted to 23.8 ppb for chronic exposure. This value is almost precisely the odor threshold for H_2S (25 ppb), so that persons noting the distinct rotten egg odor may be, indeed, at risk.

While lethal at concentrations in excess of 200 ppm, the toxic effects of H_2S at lower concentrations is less well understood. At 150 ppm it induces olfactory nerve paralysis (loss of smell) and individuals so exposed for 8-48 hours have been lethally affected. Prolonged exposures to 100-150 ppm can lead to depression and systemic nervous symptoms. At 50-100 ppm, eye and respiratory tract irritation has been reported after one hour of exposure. At 50 ppm, conjunctivae and corneal epithelium are still irritated. This phenomenon is known as "gas eye" among workers exposed to low levels of H_2S. Chronic exposures in rayon spinning rooms to 20-50 ppm have been related to conjunctivitis possibly leading to keratitis. One report notes these effects at only 3.6 ppm H_2S. Other reports of chronic exposure at less than 10 ppm indicate "neurasthenic troubles" and fatigu

In sum, it might be worthwhile to monitor H_2S emissions at the site to see if sustained levels of 10 ppm are achieved.